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THE MARTEN IN ENGLAND AND WALES.

BY H. E. FORREST.

IN 'The Zoologist,' 1891-3, Mr. J. E. Harting gave a detailed account of the Pine Marten (*Mustela martes*) and its distribution throughout Great Britain and Ireland.

The object of the present paper is to supplement the above, and to bring it up to date as regards England and Wales. To avoid repetition, the records in Mr. Harting's papers are merely indicated below by the letter H, followed by the year of occurrence. Their inclusion renders this paper more complete, without materially increasing its length.

The Marten still lingers in the Lake District and in the north-west of Wales. It has therefore seemed most convenient to deal first with those districts, taking next the counties adjoining, and finally the isolated occurrences in the eastern and southern counties of England.

Anglesey.—Not recorded.

Carnarvon & Merioneth.—Still found in the wilder parts of these counties, though in reduced and rapidly diminishing numbers. The late Mr. E. O. Partridge, of Farchynys, Dolgelley, records sixteen killed in that district in 1893. Stuffed specimens are to be seen in many houses and hotels in these counties.

Cardiganshire.—No record except an example reported to me
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by Mr. W. Yelland, who saw it at Hafod, near Devil's Bridge, about 1878.

Radnorshire.—The late Mr. J. W. Lloyd had a specimen killed at Stanage about 1840, and records one obtained at Harpton Court about 1862. Another taken about the same date is preserved at Clyro Court, whilst Mr. O. R. Owen reports two killed near Rhayader in the late nineties. Mr. J. W. Vaughan states that in the winter of 1906–7 several Hares were found dead by a shepherd near Erwood. In each case the animal had been killed by a bite just over the heart; this is said to be the way a Marten always kills its prey. There is other evidence that the Marten still exists in Radnorshire and in the neighbouring county of Brecon.

Brecon.—H. Several between 1857 and 1886. In the last-mentioned year Mr. E. Cambridge Phillips records one seen near Brecon. Several observers report the Marten as still existing in the county, though in very small numbers.

Pembroke.—No certain record.

Carmarthen.—H. About 1868. Mr. W. M. Congreve informs me that Jeffreys, of Carmarthen, had two to preserve, shot by Mr. Thompson, of Glyn Abbey, Kidwelly, about 1880.

Glamorgan.—H. 1849. Mr. T. W. Proger remembers a pair being trapped at Courtyralla, near Cardiff, in 1872. The female is now in the local museum. Sir John Llewelyn informs me that he had one brought to him for preservation at least thirty-five years ago; it was obtained near Swansea.

Monmouth.—Mr. T. W. Proger reports two or three trapped in the neighbourhood of Pontypool about 1866. H.: one at Grosmont, 1873.

Herefordshire.—H. Three about 1860; others 1861, 1866, 1873, 1878, 1884. Mr. J. B. Pilley informs me that two were obtained at Haywood and Wellington (both places within a few miles of Hereford city) in the eighties.

Gloucestershire.—H. Formerly; 1881.

Worcestershire.—Hastings described it as rare in 1834, and as formerly inhabiting Malvern Chase.

Warwickshire.—Not recorded.

Staffordshire.—Recorded by Garner as taken near Cheadle, and at Needwood; no dates are given, but must have been prior



to 1844. Mr. J. R. B. Masefield writes that one was obtained on the Staffordshire side of Dovedale many years ago. From independent sources the Rev. F. C. R. Jourdain gathers that the date was about 1835.

Derbyshire.—Mr. Jourdain also informs me that a Marten was exhibited in a cage in the market-place, Manchester, about 1830, that was said to have been taken in the High Peak.

Cheshire.—Byerley records two obtained in Wirral in the forties. Mr. R. Newstead mentions one killed at Sandbach in 1876, and a male, now in the Chester Museum, killed at Eaton (the Duke of Westminster's seat), July 8th, 1891.

Denbigh & Flint.—A few days after the Eaton example was obtained another was killed at Hope, whilst in April, 1892, another was taken at Connah's Quay. The Marten still lingers precariously in the far west of Denbighshire, and possibly in Glyn Ceiriog (*cf.* Forrest, 'Fauna of North Wales,' p. 31).

Montgomery.—None recorded for many years till about 1865, when one was killed at Maesmawr, near Welshpool. Another, in the collection of the late Mr. G. Dumville Lees, was obtained at Abermule in November, 1895, and reported by Mr. Lees at the time in the 'Field.'

Shropshire.—Eyton wrote of the Marten as getting scarce in the thirties, but I know of six or seven examples obtained in the Ludlow district during the forties. One was obtained in Stokes Wood, Craven Arms, in 1862. No others till 1907, when two were taken, both females; the first near Chirbury about April 20th, the second at Millichope a fortnight later. This last has been presented by Capt. Beckwith to the Shrewsbury Museum.

Lancashire.—H. Still found in Furness district, 1877. In 'The Zoologist,' 1896, p. 376, Mr. J. R. Denwood records one at Coniston in June, 1896. In 'The Zoologist,' 1904, p. 455, is a record of an old female obtained in the same district, May 13th, 1902.

Yorkshire.—H. 1854, 1877, 1880, 1881, 1884. Mr. H. B. Booth tells me that a Marten was obtained at Buckden, on the north-west border of the county, about 1880; whilst Mr. T. H. Nelson recorded in 'The Zoologist,' 1900, p. 517, an old male taken at Swainby, in Cleveland, Feb. 9th, 1900. Messrs. Clarke and Roebuck, in their 'Fauna,' record Martens near Whitby in

the sixties, and in 1877; Barnsley, 1878; near Ripon; and above Masham in 1870.

Durham.—H. 1835, 1849, 186-, 1882. Mr. T. H. Nelson informs me that one was killed in Weardale about 1880. Sir Alfred Pease heard of one being taken near Bishop Auckland about 1896.

Westmorland.—H. 1877. One recorded above Elterwater, Sept. 10th, 1896, by Mr. J. R. Denwood (Zool. 1896, p. 376).

Cumberland.—H. Still plentiful, 1877. Obtained 1886, 1887, 1892. The late Rev. H. A. Macpherson, in his 'Fauna of Lakeland,' gives a very full account of the Marten in the Lake District, with many interesting details regarding its habits and the local methods of hunting and trapping the "Sweet Mart." The animal still lingers in the Lake Country, though, unless steps be taken to preserve it, it will soon be exterminated.

Northumberland.—H. 1871, and two in May, 1883.

Lincolnshire.—H. 1843, 1854, 1858, 1866, 1871, 1879, 1882. In 'The Zoologist,' 1893, p. 354, one is recorded near Sleaford about 1889.

Leicester.—H. Two or three many years ago. Mr. F. T. Mott informs me that a Marten was killed at Bradgate about 1868; then none reported till December, 1903, when Mr. H. S. Davenport saw one in Tugby Wood. He recorded it at the time in the 'Field.'

Notts.—Mr. J. Whitaker thinks that the Marten must have formerly been found in Sherwood Forest. A specimen in Mr. Becker's collection was killed at Winkburn in 1850, while two captured on the Worksop Manor estate in 1872 are mentioned in the 'Victoria History.' A Marten taken in a cellar at Nottingham in 1901 was doubtless an escape.

Norfolk.—H. 1843, 1864, 1878.

Suffolk.—H. Three in 1811; male shot and another seen, 1889 (Zool. 1892, p. 134).

Cambridge.—H. 1844.

Northants.—H. 1840.

Bedfordshire.—H. Prior to 1859. Mr. J. Steele Elliott has notes of several in the forties, and evidence that the animal was not uncommon early in the nineteenth century.

Oxfordshire.—H. One or two many years ago.

- Bucks.*—H. Formerly existed.
Berks.—H. One; no date.
Herts.—H. 1872.
Essex.—H. 1845, 1853.
Kent.—H. About 1830.
Surrey.—H. 1834, 1847; one seen by Mr. G. E. Lodge near Dorking, May 12th, 1879.
Sussex.—H. Three about 1841; 1866.
Hants.—H. About 1845, 185-.
Wilts.—H. Seventeenth century.
Dorset.—H. 1851.
Devon.—H. 1871; nearly extinct, 1877.
Cornwall.—H. 1843, 1878.

DIGEST.

From the above records several interesting conclusions may be drawn:—

1. The Marten became rare throughout the midland and south-eastern counties during the first half of the nineteenth century.

2. In most of these counties it became extinct before 1860, but since that date there have been isolated occurrences in Herts, Surrey, and Sussex.

3. In the group of eastern counties—Lincoln, Norfolk, and Suffolk—it survived into the eighties, whilst there have been recent occurrences in Leicestershire.

4. In Devon and Cornwall it lingered into the seventies.

5. At the present time there are but two tribes of Martens remaining in England and Wales, their respective headquarters being the Lake District and the west of North and Central Wales.

6. From time to time Martens still occur in the counties contiguous to these two districts.

7. Recent records are most numerous in the counties nearest to these districts. (Lincolnshire is an exception.)

8. In Wales the Marten has occurred in all the twelve counties except Anglesey and Pembroke, but appears never to have been common in the southernmost counties.

ROVING DISPOSITION OF THE MARTEN.

Leaving out of the calculation those counties where the Marten is believed still to exist, it will be observed that isolated examples have occurred within the last thirty years in the counties of Cheshire, Hereford, Montgomery, Flint, Shropshire, Lancashire, and Yorkshire; as well as further off in the eastern counties of Lincoln, Leicester, Norfolk, Suffolk, and Surrey.

In nearly every county mentioned the Marten had been regarded as long extinct. In some instances intervals of twenty, thirty, and even forty years had elapsed since the last previous record; when without the slightest indication of the animal's existence in the neighbourhood a Marten has been seen, trapped, or shot.

Take Shropshire, for example. The last prior record was in 1862. During the ensuing forty-five years there was not even a rumour of the existence of the Marten within the limits of the county, and the species was regarded as locally extinct. Yet in the spring of 1907 two Martens—both females—were taken within a fortnight at places only a few miles apart, and in the same part of the county as the 1862 example.

Somewhat similar are the records for the counties to the north—Montgomery, Flint, and Cheshire. In the first of these a period of thirty years elapsed between the two examples being obtained. But in the other cases the events are rendered still more remarkable by the nature of the localities. Two Martens were obtained in 1891, within a few days of one another, at Hope (Flintshire) and Eaton (Cheshire), whilst in 1892 another was taken at Connah's Quay (Flintshire). All these three places are within ten miles of one another, but they are of a character quite unsuited to such an animal as the Marten. Eaton Park is the seat of the Duke of Westminster; it is flat country, laid out artificially in plantations and ornamental grounds. Connah's Quay is a dreary flat alongside of the Dee estuary, chiefly used as a place for shipping slates. Hope is not quite so unsuitable, but lies low in a fairly populous and cultivated district.

I cannot believe that any of these five Martens, nor the two recent Shropshire examples, belonged to the districts where they were taken; neither do I believe they had been there any length of time. How, then, can their presence be accounted

for? In my opinion the answer to this question is to be found in the Marten's innate love of roving. This trait would not be noticeable as long as the animal was common, because any examples met with would be regarded as denizens of the districts where they occurred. It would only become obvious when a Marten turned up in a district where it had been long regarded as extinct.

Independently of such incidents, however, several writers have noted the Marten's propensity for roaming. Thus Mr. George Bolam, of Berwick-on-Tweed, writes (Zool. 1893, p. 132): "The travelling capabilities of the Marten are too well known to require further comment." Again, Mr. Dumville Lees, reporting the Abermule specimen in the 'Field,' Nov. 23rd, 1895, remarks:—"I know that Martens travel long distances at all times, but particularly in the early spring." (Parenthetically, I may state that the isolated occurrences of the Marten recorded above were mostly in the early part of May.) In a later issue Mr. E. O. Partridge, of Farchynys, near Dolgelley (who had a more intimate acquaintance with the Welsh Marten than anyone else in recent times), adds:—"I quite endorse the opinion of Mr. Lees that Martens travel long distances, but I think that, as a rule, after their night's ramble, they return and remain pretty much in any favourite locality where they have taken up their quarters. It has more than once happened to us, when the snow has been lying deep on the Grouse-moor, to hit on the track of a Marten, and, after following it for miles, to find, just as evening was coming on, that the ring of many miles had brought us round pretty nearly to the point of starting." It has been found, by tracking in the snow, that frequently the Marten will cover a circuit of fifteen miles in a day, and that not when it was flying from pursuit but merely seeking food.

To an animal that will travel such distances of its own accord the journey from (say) Dolgelley to Abermule would be a trifle, so it is conceivable that, if the quest for food had brought a Marten over the intervening high land, it might take up its quarters in this new district.

It is to such circumstances as these, I believe, that the recent occurrences in Shropshire, and those recorded at Eaton, Hope, and Connah's Quay are due.

Similarly, the examples met with during recent years in Yorkshire and other northern counties were probably wanderers from the Lake District. Possibly, also, those recorded in North Lincolnshire.

Without wishing to dogmatize, I would further suggest that, if a Marten had wandered very far from its native haunts, it would perhaps be less inclined to settle down; it would go on wandering until it at length met its fate in some country too civilized for this beautiful creature of the wilds.

Of our native mammals, none excel the Marten in grace of movement and beauty of form. Can nothing be done to prevent its extermination? If any action be taken, it should be speedily. To preserve it throughout the country would be impracticable, but I suggest that some large landowner in Wales or the Lake District should make his estate a sanctuary for the animal, and let his keepers strictly preserve it. This plan was adopted in Scotland for the Golden Eagle, and with entire success. There would be no risk of undue multiplication of the species, as the Marten is so easily trapped that, if eventually the numbers on the estate became too great, the owner could give orders to reduce them. In such cases individual control is far more effective than legislation.

SWARMS OF INSECTS, &c., IN THE CRIMEA.

BY LIONEL E. ADAMS, B.A.

ON three separate occasions when I have visited the Crimea I have encountered one or more instances of various insect forms swarming in enormous quantities and being dispersed to considerable distances, and it has occurred to me that a brief account of these may be of interest to students of the ways and means of the distribution of various species across the sea.

*Moths.**—On August 27th, 1901, we left the Bosphorus at sunset for Eupatoria, a distance of roughly three hundred and seventy English land miles. On coming on deck the next morning at eight o'clock I found the whole ship covered with a small moth, which also filled the air like flakes in a snow-storm. All day long we had a pair of Warblers on board, which had apparently been blown off the land with the moths or had followed them of their own accord. I caught one in my hand and released it unharmed. They were very tame, picking up the moths greedily from the deck close to my feet.

We experienced a strong head wind all the way across to Eupatoria, and the flight of moths met us all the way across the swarm being plentiful there on our arrival. Four days later we anchored in Karkinit Bay in the Gulf of Perikop. I quote from my field note-book :—"Sept. 6th, 1901. I found the shore at Bakal lined twenty to fifty yards in width with small bushes and brambles. These were thickly crowded with the same small moth that we have had in crowds all across the Black Sea. At every step among the bushes a swarm of disturbed moths would fly up."

The next year I was in the Black Sea rather later when the annual (?) swarm of this small moth was presumably almost over, for I find the following entry in my field note-book :—"Aug. 21st, 1902. The same species of Warbler that came on board last voyage came on board at Kavak, and accompanied us to Theodosia. It was after the same species of moth as before."

* I much regret that the specimens brought back for identification have always miscarried.

Again, quoting from my field note-book :—"July 26th, 1907. All across the Black Sea from the Crimea to the Bosphorus we were accompanied by a mighty swarm of moths—the same, I think, that I noticed in 1901. A vast swarm of beetles and butterflies (Painted Ladies) accompanied them, and also a few other moths. A strong and continuous north wind brought them."

Dragonflies.—In August, 1902, we were lying off Ghenitshesk in the Azov, and were troubled with flies and gnats &c. that were blown out to us from the shore; they came in great quantities quite suddenly with a change of wind. My note-book records our deliverance from the plague thus :—"August 26th, 1902. A swarm of small dragonflies (blue, red, and yellow) invaded the ship and fed on the gnats &c." Our authority, Mr. W. J. Lucas, identified them as *Sympetrum fons-colombii*, which he informed me were migrating at this time. Most of them departed in a day or so, though occasional stow-aways emerged from odd corners during the rest of the voyage.

*Beetles.**—Lying off the southern end of the Tonka of Arabat in the Azov we experienced a plague of beetles, which I recorded as follows :—"July 10th, 1907. To-day there was an epidemic of black beetles about an inch long, which flew on board in crowds, and were swept up in heaps dead—some killed by paraffin, and some roasted to death on the hot steam pipes &c. The swarm has evidently been immense, as it lasted for three or four hours, and came with the north wind which must have blown the beetles from the north coast some fifty miles away, and therefore quantities must have been drowned on the way. When I went ashore at four p.m. (a distance of two miles) drowned beetles were to be seen in thousands all the way to the shore." This species came again in batches every two or three days and, as previously mentioned, accompanied us across the Black Sea. I have the following note written when the Bosphorus was again reached :—"Black Sea July 24th, 1907. At Kertch (July 22nd) I saw hundreds of the same beetles in the sea, and all across the Black Sea we had another plague of them, especially on July 24th. There was a north-west wind all the time, which brought them from the Crimea."

* I am indebted to Mr. W. F. Kirby for identifying these as *Harpalus calceatus*, Duftschm.

Butterflies (Pyrameis cardui).—Perhaps the most remarkable swarm was that of Painted Ladies. I quote from an entry in my field note-book, written just before leaving Arabat Bay for Kertch on July 20th :—" Ever since July 10th Painted Ladies have been very numerous, but on the 15th and 16th the ship was swarming with them, and as far as the glass could reach the air was full of them, all coming down with a north wind. Only comparatively few stopped on board the ship. The swarm continued for two days. On the third day when I was ashore, as I walked along the Tonka among the low scrub, hundreds rose as I disturbed the bushes. Swallows and Hoopoes were about hawking for insects, but I did not see them go for the Painted Ladies. At night at the merchant's house* they roosted in thousands among the small trees and the creeper covering the verandah and were easily picked off asleep. On one occasion when we were dining under the creeper by candle-light someone gave the creeper a smart jerk above our heads, whereupon a cloud of the sleepy creatures fluttered down, and we counted over a hundred on the cloth. With this swarm there were a few other species, among which the most prominent were the Gold-tail (*Porthesia auriflua*) and the Spurge-hawk (*Deilephila euphorbiæ*)."

"July 26th, 1907. We left Kertch July 22nd, and were followed almost to the Bosphorus by a north-west wind. On the 24th we came into a swarm of *P. cardui*, which had evidently been blown from the Crimea. Ever since the first swarm at Arabat I have noticed these butterflies in vast numbers wherever I have been ashore (*i. e.* at Akmanai, Theodosia, and Kertch). A very noteworthy characteristic and one that I have not observed before in any butterfly is the habit of soaring through the air like a bird without flapping the wings. It was a curious and beautiful sight."

Toads (Bufo viridis).—" July 13th, 1907. Leaving Theodosia by train for Akmanai (a distance of thirty miles) we passed over flat arable land which had been deluged with rain during the previous night. During the whole of the journey the railway

* A small farm used by our charterer temporarily while we were loading, and where I often spent the night instead of returning on board after a ramble ashore.

track was literally black with small Toads which tried to hop away at our approach. The fields and ditches by the line were also swarming with Toads as far as could be seen."

Unless one has witnessed a flight of Locusts, or the immense shoals of migrating fish, it is difficult to imagine the magnitude of these swarms. It might help one to realize the conditions of such invasions if a swarm on a like scale were to invade the British Isles, the length and breadth of which roughly correspond with the area which my observations show to have been actually covered by some of the swarms in the Black Sea and Azov—though how much further they travelled south, or from how much further north they came, or how wide a space the flights covered, I cannot say. My impression is that most of these particular flights would be checked by the hills on the south of the Black Sea where the wind dies down, for as soon as this happens insects, especially beetles, have a tendency to drop and settle—a fatal proceeding if they happen to be over the sea at the time. At any rate the north-west wind which carried the Painted Ladies and the beetles died down as we reached the Bosphorus, and I only noticed a few of the former at Constantinople, and none after that except one or two on board the ship that had most likely been passengers from the Black Sea.

Suppose, then, such a flight of butterflies or beetles covering the whole of our islands for the best part of a week—or suppose that after a thunder-shower the whole of Middlesex were to become black with hopping Toads—I think the papers would universally chronicle such events; whereas only a few ocean-going tramps pass through these Russian swarms, and the only notice taken is evinced by a little extra "language" when the beetles or what not mingle with the "Harriet Lane" or "White-chapel Mysteries" in the mess-kids. Of course the moujiks ashore never seem to notice anything.

As I have watched these myriads of wind-borne creatures lightly hurrying past for days together the thought often occurred to me that, given a continuance of favourable winds, a tremendous distance might be traversed before the crowd would become too thin to make sure of some settling on ocean islands, however small and scattered.

AN ANNOTATED LIST OF CORNISH FISHES.

BY JAMES CLARK, M.A., D.Sc., A.R.C.S.

(Concluded from vol. xi. p. 459.)

THE Thick-lipped Grey Mullet (*Mugil chelo*, Cuv.) occurs commonly all the year round along the south coast in small shoals or schools, and is of frequent occurrence at St. Ives. During the summer months it is plentiful in harbours and estuaries, and has been reported in the Fowey some distance beyond the reach of tidal water. In July, 1904, several were taken one afternoon with an artificial fly at Truro Quay; and Cunningham mentions that it is common in Swanpool, near Falmouth, an almost freshwater ley, into which the Mullet can only enter through a narrow grating when they are young and quite small. By far the most important catches in the county are made at Sennen, near Land's End, where there is a regular Grey Mullet fishery throughout the winter. Enormous schools congregate there almost every year, and by means of a special draw-seine, the ownership of which is divided into ninety-five shares, as many as ten to twelve thousand have been captured at a time. The first school is expected about the middle of November, and in some seasons the fish are taken all through the winter, especially on moonlight nights. They are often seen lying for days in an awkward place under the cliffs or on a rocky ground, and are carefully watched till the school moves into shallower water on a sandy bottom, where the seine can be shot. They also appear frequently in various coves between Whitsand Bay and St. Ives, and are common in Lelant estuary during summer and autumn (Vallentin). They have been taken at Newquay, and at least once, about seven years ago, at Port Isaac. When a seine is shot the fish, as a rule, become very lively and excitable, and at times a large number may spring high out of the water over the edge of the net. A little straw on the surface of the water, however, will prevent their jumping. The Sennen

fishermen often go into the water up to their waists and hold the edge of the net overhead to hinder their escape. Elsewhere along the south and about St. Ives the schools are relatively small. The largest specimen handled by the writer weighed twelve pounds fourteen ounces, and was taken at Coverack. Great schools of young Grey Mullet an inch or less in length are occasionally seen in Falmouth Harbour from the middle of July to the middle of August. On the 14th of July, 1906, there was a great swarm on Gyllyngvase beach, where the long stretch of sand abuts against the low weed-covered rocky ground opposite Swanpool. Last year (1907) they were plentiful in Fowey Harbour during the third week in August, and at Mevagissey a few days later. The Thin-lipped Grey Mullet (*Mugil capito*, Cuv.) is not distinguished by the fishermen from the preceding species, but Day implies it was common along the south. In December, 1906, two were sent in from Sennen, and in February of the present year (1907) a school appeared in Falmouth Bay and Harbour, but these seem to be the only recent records. The Sand Smelt or Atherine (*Atherina presbyter*, Jenyns) is a common visitor in large shoals in autumn, and colonies remain here and there in shallow water along the south coast, as at Mevagissey, St. Mawes, Coverack and Porthleven, throughout the winter. In January, 1907, several were picked up dead on the sand at the Bothwick Rocks, Newquay. The Larger Launce (*Ammodytes lanceolatus*, Lesauvage) is locally common on sandy bottoms in shallow water along the south coast, and on the north especially at St. Ives, where this and the next species are often taken in large numbers in a drag-seine shot with that intention. Vallen-tin has seen the Gannets there so gorged with this fish as to be unable to fly. In other localities it is generally dragged out of the sand by sickle-shaped hooks specially made for the purpose. The Lesser Launce (*Ammodytes tobianus*, L.) is very common on sandy shores all round the coast. The Pike (*Esox lucius*, L.) was introduced by the Rev. John Daubuz into one of his ponds at Killiow, near Truro, but it died out or was exterminated many years ago (J. D. Enys). The Garfish or Gerrick (*Belone vulgaris*, Flem.) occasionally appears in shoals in March, as off the Wolf Rock in 1900, and about seventy miles N.N.W. of the Longships in 1907; and sometimes in autumn, as, for example, eight miles

south of the Lizard in September, 1902; but it is usually found accompanying Mackerel, and, indeed, a few are taken with almost every catch of that fish. In July, 1907, an adult specimen was captured with a baited hand-line off Newquay. When so taken it displays remarkable activity, and sometimes tangles the line in a very singular fashion. In spite of its bright green bones and unpleasant odour this fish is much in demand at Newlyn for the London market. Elsewhere it is greatly appreciated as bait, and when cut into strips or "snaids" is more effective than Mackerel. On Oct. 8th, 1907, a large shoal of young Garfish from three and a half to four inches long was noticed in Falmouth Harbour. Three days later they had all disappeared. The Saury Pike or Skipper (*Scombresox saurus*, Bl. Schn.) is evidently a regular visitor—often in large shoals—off the south and west of the county, and at least occasionally in the Bristol Channel. Large quantities are frequently taken a mile or two off land in summer and autumn in drift-nets and in Pilchard-seines, and it has been obtained in the Fowey almost at the limit of tidal influence. In September, 1903, it was remarkably abundant several miles south-west of Newlyn, and in November, 1901, a drift-boat brought in a number at Newquay. The Greater Flying-fish (*Exocoetus volitans*, L.) was reported by R. Q. Couch as having been seen by him in Mount's Bay, but the only authentic specimen recorded from the county was obtained by I. Couch from the Helford River. The Three-spined Stickleback (*Gasterosteus aculeatus*, L.) is somewhat locally distributed round the county, but abounds in many of the streams. At times in the late spring the variety *trachurus* is plentiful in Fowey Harbour, about Falmouth and Helford, and in 1902 was common at the Fistral Beach, Newquay. The variety *spinulosus* is common in the streams of the middle and west, but apparently scarce in the east, and the variety *gymnurus* occurs somewhat sparingly in the streams about Truro. The Fifteen-spined Stickleback or Sea-adder (*G. spinachia*, L.) is common along the south coast and local on the north. Its nests are occasionally found among the low weed-covered rocks between tide-marks at the westerly end of Fistral Bay, Newquay.

The Broad-nosed Pipe-fish (*Siphonostoma typhle*, L.) is fairly common locally among *Zostera* along the south, and particularly

in Falmouth Harbour and the mouth of Helford River. It has also been taken at St. Ives, at Padstow, and near Bude. The Greater Pipe-fish (*Syngnathus acus*, L.) is occasionally taken at Gyllyngvase Beach among the seaweed at low spring-tide, is moderately common on weed-covered bottoms and on low rocks from shallow water downwards along the south and west, and may occasionally be seen slashing along the surface of the water as much as three or four miles from land. On the north coast it has been taken at St. Ives and at Padstow. *Syngnathus rostellatus*, Nilsson, has till lately been confused with *S. acus*. It has been obtained at Cawsand Bay (M. B. A.), at Mevagissey, and near Coverack, and may be common. The Snake Pipe-fish (*Nerophis æquoreus*, L.) is common, at least locally, all round the coast from shallow water downwards. It is often found attached to Crab- and Lobster-pots, and in August, 1907, several pieces of netting submerged in Falmouth Docks for six weeks by the writer in connection with some County Council net-tanning experiments were taken possession of by hundreds of this fish. They were all immature, the largest being nine inches in length, and clung tightly to the thread of the net by means of their tails. One piece of the netting, about three yards square, slimy with green seaweed, carried no fewer than a hundred and twenty-two specimens when it was pulled on board, and another piece, six feet by two, had forty-seven! The Straight-nosed Pipe-fish (*Nerophis ophidion*, L.) is evidently variable in number, but in some years, notably 1904, was locally the most plentiful of all the Pipe-fishes in the county, and on certain days during the summer literally swarmed under stones and tufts of seaweed from half-way between tide-marks downwards about Mevagissey, Gorran, and the mouth of Helford River. It is at times common in shallow water, and has been dredged in quantity down to thirty and thirty-five fathoms in Falmouth Bay. For the last two years (1906 and 1907) it has been very scarce as a littoral species at Gyllyngvase and Helford, and apparently, indeed, all along the south coast except at St. Michael's Mount. Specimens are occasionally taken along the north coast as far as Bude, where, in July and August, 1905, it was fairly plentiful. The Worm Pipe-fish (*Nerophis lumbriciformis*, Yarr.) is not uncommon in weed-covered rock-pools, and is occasionally plentiful under stones at

low spring-tide along the south and west. On the north coast it has been found at St. Ives, and in August, 1905, a single specimen was obtained under a stone at the Black Rock, Widemouth Bay, Bude. The Hippocampus or Sea-horse (*Hippocampus antiquorum*, Leach) was taken some years ago in a ground-seine at St. Mawes (Rice). On Sept. 14th, 1899, one was captured at Porthleven, on Mount's Bay. An attempt was made to bring it alive in a pickle-bottle to the Technical Schools, Truro, but it died on the way.

The Carp (*Cyprinus carpio*, L.) is common in ponds throughout the county, and the Golden Carp or Gold-fish (*C. carassius*, L., var. *auratus*, Bl.) thrives in ornamental ponds and fountain-basins. Both are, of course, introductions. The Gudgeon (*Gobio fluviatilis*, Flem.) is mentioned by Couch as having been introduced into some ponds near Penzance, but Cornish knew nothing of it, and there is no subsequent record; so that it has probably died out. Dace (*Leuciscus dobula*, L.) was recorded by Couch as confined to the Tamar and its tributaries, and Miss F. E. Tripp describes one that was caught in the Linney. In spite of assertions to the contrary, it does not appear to have been taken either in the Camel or the Fowey. The Minnow (*Leuciscus phoxinus*, L.) has not been seen by the writer west of Truro, though it occurs locally in that neighbourhood, and is probably plentiful in the streams of the east, as Couch, who knew the latter well, says it is common in many of the rivers, but not in all. It is certainly abundant at Trebartha, and in most of the tributaries of the Lynher. It also occurs in Dosemary Pool (J. D. Enys), and in the stream at Harlyn, near Padstow. The Tench (*Tinca vulgaris*, Cuv.), first introduced by Sir Rose Price, Bart., into the ponds at Trengwainton, Penzance (R. Q. Couch), is now a common pond-fish throughout the county. The Loach (*Nemachilus barbatulus*, L.) is evidently scarce in the middle and west, but is reported as plentiful in the east. Miss F. E. Tripp, in some MS. Notes on the Natural History of the Altarnum district, speaks of it as a familiar object in the Linney, and it is found in some of the tributaries of the Fowey. It has been reported from one of the Looe streams, and from the Perranarworthal stream at Ponjeravah, near Constantine. The Salmon (*Salmo salar*, L.) is chiefly confined to the Tamar, the Fowey,

and the Camel, though during the last few years mine-pollution has almost destroyed both Salmon- and Peal-fishing in the Fowey. Salmon will at times linger for weeks at its mouth without attempting to enter the river till a heavy flood has purified its waters (H. J. Rowse), and in many cases, according to the local fishermen, will pass out to sea again without entering at all. The Camel and the Fowey are among the latest Salmon rivers in England, the bulk of the fish appearing in November and December. Rod-fishing is allowed up to Nov. 30th. Peal (*Salmo trutta*, L., var. *cambrensis*, Donovan.) naturally frequents the same rivers as the Salmon. It begins to run up the Fowey in May and the Camel in June (H. J. Rowse). These early fish are large but few in number. The smaller fish—the school Peal—appear from July or August onwards. The spring Mackerel boats often encounter shoals of Peal in the mouth of the Bristol Channel, most frequently about ninety miles N.N.W. of the Longships. The Trout (*Salmo fario*, L.) is plentiful in almost every non-polluted stream in the county. The indigenous variety—at least in the small streams—is *cornubiensis*, Walb., in which the parr finger-marks persist through life, and the length rarely exceeds eight inches. Several varieties and species have been introduced from time to time into ponds throughout the county.

The Anchovy (*Engraulis encrasicolus*, L.) is probably much more plentiful out at sea round the Cornish coast in autumn and winter than the records would indicate, as the size of mesh in the nets of the drift fishermen is much too large to capture it. In November, 1871, Matthias Dunn took one hundred and fifty thousand in Pilchard-seines set in Mevagissey Bay; and when tow-netting just outside the entrance to Falmouth Harbour on Dec. 4th, 1902, the writer's boat passed through a dense shoal of undersized fish averaging three to three and a half inches in length. A few are caught every now and then in Pilchard-nets all along the south coast and at St. Ives. It is usually scarce, however, close inshore, but large shoals have been reported during the last eight years by Herring-boats south of the Dodman, off Falmouth Bay, at the mouth of the English Channel, and in the lower reaches of the Bristol Channel. In the opinion of the fishermen, however, its appearance is much too uncertain

and irregular to justify the expense involved in equipping the boats with the small-meshed nets necessary for its capture.

The Herring (*Clupea harengus*, L.) in Cornwall practically reaches the southern limit of its distribution. Till lately, though large quantities were taken off the Cornish coast in autumn and winter, it was not of sufficient importance to maintain a separate fishery. About twenty-five years ago it appeared in increasing numbers around St. Ives, and, as the seine fishery for Pilchards died out there a Herring fishery was gradually developed in its place. During the last few years the average annual export of Herrings from St. Ives has been about two thousand tons. Port Isaac, and to a smaller extent Newquay, are now also centres of regular Herring fisheries. On the south coast large quantities are brought in at Looe and Mevagissey, and recently the schools of Herring have been abundant and regular in their appearance from the Runnelstone to Porthleven. At present the best ground in the south is off St. Loy, both for the size and the frequency of the takes, but during the last three seasons the numbers in and about Mount's Bay generally have been so great that the Newlyn men are looking forward hopefully to the establishment of a regular Herring fishery there. The movement of the Herring from deep water shorewards for spawning purposes and their migration along the coast are somewhat irregular, and greatly affected by the weather and other less recognisable influences. A storm drives them at once into deep water, where they remain till fine weather again tempts them inshore; but even with little or no change in the surface of the sea they may be found some distance out one day and close in on the rocks the next. In some seasons the fish at particular localities spend much more time inshore than usual, or else hug the shore much more closely in passing. At Sennen, near Land's End, for instance, the Herring generally pass some distance out at sea, but during the winters of 1905-6 and 1906-7 large schools were frequently seen within a quarter of a mile of the breakers, but unfortunately the fishermen there do not possess sufficient equipment to enable them to make full use of such opportunities.

There is no spring Herring fishery in Cornwall, but large specimens are taken in the Mackerel-nets in May and June out in the Channel and N.N.W. of St. Ives, and in June, July, and

August by Pilchard drift-nets in deep water. In October numbers begin to put in an appearance on the south coast, though the fishing about Mount's Bay and westward does not generally commence till the middle of the following month. Early in November, as a rule, large schools are found travelling westward along the Bristol Channel past Port Isaac, Newquay, and St. Ives. These north coast fish are usually of medium size, but amongst the November arrivals on the south coast are a number of large Herrings that spawn later than the great majority of the medium and small-sized ones—in February for the most part instead of in December and January—and, as Matthias Dunn suggested, may represent a different strain that comes directly inshore from deep water instead of coasting round the county. This present season, however, Herring of very unusual size have already (Nov. 20th, 1907) been taken in quantity all along the north coast, and the Port Isaac men complain that their packing barrels, made to contain five hundred, will hold no more than three hundred and a quarter. The Herring fishery is most productive in November and December, but is often continued with success into the New Year, though, of course, the percentage of "shotten" fish increases rapidly after Christmas. Fish are at times taken in quantity as late as the month of March out to twenty miles south of the Lizard. Though usually regarded as surface-feeders, Herring are occasionally taken on the bottom in fairly deep water. A number of large full specimens were taken with a beam-trawl in twenty fathoms of water in Falmouth Bay in December, 1901, and several of medium size in thirty-five fathoms about the end of October, 1904. The Sprat (*Clupea sprattus*, L.) apparently fluctuates considerably in its numbers and distribution, for Day, as a result of personal investigation, says it is rare along the south coast of the county, though numerous at St. Ives, whereas during the past four years it has been locally common along the south from Polperro round to the north coast. In 1900 and 1901 it was scarce at St. Ives, and on the south was only obtained in quantity in Mount's Bay, while scarcely a single specimen was captured further east. Probably on account of the irregularity of the supply there is no regular Sprat fishery in the county, except with ground-seines at Saltash and on the shores of the Hamoaze. The Pilchard

(*Clupea pilchardus*, L.) is the most characteristic of Cornish fishes. Though occasionally taken off Exmouth and Seaton, its English range, from the fisherman's point of view, has in the past been from Trevoze Head, near Padstow, all round the Cornish coast to Start Point, in Devon. In or about 1883, however, the large shoals that visited the north coast in abundance in the autumn somewhat suddenly ceased to put in an appearance except in a casual way, and though large quantities of Pilchards still appear in September and October off St. Ives, the great diminution in the coasting shoals has caused the large Pilchard seine-fishery there to dwindle into insignificance. Casual fish are taken at the end of May and early in June, but the great schools do not enter the Cornish seas till the middle of June or later. The fish are usually thickest close inshore, though in June and July, 1905, they were remarkably abundant and compact some five miles south-east of the Wolf. All through the summer, as a rule, Pilchards are plentiful and dense in Mount's Bay, and this is naturally the seat of the most extensive Pilchard fishing in the county. In addition to the local boats from Mousehole, Newlyn, and Porthleven, the St. Ives men fish there up to September, when they return to their own waters. During the Pilchard season the colour of the water in the Bay is green and thick so long as the wind keeps in the south-west, but with a northerly or north-east wind for a short time the water gets very clear with less fish (Pezzack). The Mevagissey boats fish, as a rule, off Veryan and the Dodman, and the Looe boats about Downderry and Portwrinkle. This summer, however, for the first time for many years, Falmouth Bay proved to be the best of all the fishing centres, especially in the neighbourhood of Swanpool, though the fish did not come as close inshore as they usually do in Mount's Bay. The Pilchard fishery may come to a close in October, as in 1905, or it may continue through the month of November, and on rare occasions up to Christmas. The average Cornish Pilchard measures eight to nine inches in length, and rarely exceeds eleven, though W. E. Bailey, of Penzance, had a model made of a Cornish specimen that measured fourteen inches. As the Sardines sent to England in oil in airtight tins are simply young Pilchards which appear in great numbers off the French and Iberian coast from May to

October, Cunningham carried out a systematic series of experiments with French small-meshed nets and the French method of fishing in Mount's Bay, Falmouth Bay, Mevagissey, and Looe, to ascertain if it would be possible to establish a Sardine industry in the county. Though the small fish were occasionally found in abundance, their occurrence was much too irregular to justify the outlay on a factory.

The Allis Shad (*Clupea alosa*, L.) is commonly called the Damon Herring in Cornwall. It is often taken in an emaciated condition in the Mackerel-nets in May and June out at sea on the south and west of the county, but shoals are scarce and usually small, except inshore near the estuaries and river-mouths. In the spring of 1900 about three hundred and fifty were obtained in a Mackerel-seine at Looe, and in 1903 it was taken plentifully by the writer on the east side of the Manacles when whiffing for Pollack. Day says it is rare in Mount's Bay and St. Ives, but during the last eight years it has been of frequent occurrence in the west. It is often obtained singly in the Bristol Channel. In May, 1907, a small shoal appeared in Padstow Bay, and a little later several were captured in the Camel at Egloshayle. The Twait Shad (*Clupea finta*, Cuv.) is not so common as the Allis Shad, but a few are taken in the Mackerel drift-nets in May and June every year from off the Dodman round to St. Ives. In 1902 it was plentiful for a few days in the first half of May some miles south of the Wolf. Specimens are occasionally obtained in Pilchard-nets in August, and rarely in September.

A single specimen of *Paralepis coregonoides*, Risso, was driven on the beach alive by Porpoises at Polkerris, near Par, on June 2nd, 1869, and picked up by Matthias Dunn, who sent it to Couch, and he in turn presented it to the British Museum.

The Eel (*Anguilla vulgaris*, Turton) is fairly common but not abundant in the harbours and locally close to the shore along the south, and young ones are often plentiful in many of the streams during the early summer. It is also frequently reported from the north. The Conger (*Conger vulgaris*, Cuv.) is plentiful, and in places abundant, all round the coast, and occurs from low spring tide down to sixty fathoms. It is specially common on "scuddy" ground, but among the most favoured localities in

the county are the Epsom ground, four or five miles south of Porthgwarra, and off the Longships and the Brisons. It is captured chiefly by long-line fishermen with Pilchard or Mackerel as bait. In Cornish waters the fish occasionally attains an extraordinary size. Buckland mentions one obtained by Matthias Dunn that weighed 112 lb., and Bailey, of Penzance, saw one taken off Porthgwarra that measured 7 ft. in length and weighed 105 lb. The largest handled by the writer was $64\frac{1}{2}$ lb., and was taken at the Bizzies, near Portscatho, in July, 1900. Two examples of *Muræna helena*, L., a common Mediterranean fish, are recorded from the county by Couch, the last in 1866. In March, 1897, a specimen $44\frac{1}{2}$ in. long was trawled off the Eddy-stone, and taken to the Marine Biological Laboratory, Plymouth (Journ. M. B. A. v. 91).

The Sturgeon (*Acipenser sturio*, L.) is a fairly frequent casual along the south coast and out to the south-west. Dunn *f.* says it has been taken in the trammel-nets at Mevagissey. Rice recollects one being captured at St. Mawes, and one about 4 ft. long was taken in a trammel at Porthgwarra in the spring of 1898, the head of which was seen by the writer. The majority, however, are obtained some distance out at sea by the big trawlers. In February, 1900, one 5 ft. 2 in. long was brought in at Porthleven, and in May, 1902, a fine specimen over 7 ft. long was captured by a boat from Newlyn. In 1904 two more were reported from Newlyn. Pezzack says that to his personal knowledge fifteen to twenty specimens have been landed in that district during the past thirty years.

The Blue Shark (*Carcharias glaucus*, L.) appears along the south coast every year, and is often common in the Bristol Channel. It arrives, as a rule, in May or June, and departs in the early autumn, but its movements are greatly influenced by the warmth of the water. It evidently never puts in an appearance till the sea-temperature is over 50° F., and as a rule the hotter the summer the more plentiful does it become. It has been seen as early as the first week in March, and as late as the third week in November. In 1906 it was remarkably common in Mevagissey Bay, and a number were taken with bait and line. On its first arrival it is generally very savage, and is at all times liable to do serious damage to the fishing-gear by rolling itself in

the drift-nets and tearing them with its teeth. In August, 1906, a specimen 7 ft. 10 in. long was killed in Falmouth Bay, and still larger examples have been reported. The Tope or Toper (*Galeus vulgaris*, Flem.) is occasionally taken in Mackerel-nets and on boulders, chiefly during the summer months. On Sept. 28th, 1907, one measuring 5 ft. 2 in. in length was caught near the outer end of the Manacles, where it was ravenously pursuing a shoal of Pilchards. The only specimen of the Hammerhead (*Zygæna malleus*, Risso) recorded from the county was taken at Newlyn in 1834. The Rough Hound or Murgie (*Scyllium canicula*, L.) is common on sandy bottoms, in sandy "lanes," and at times among low rocks along the south coast, and is occasionally taken in the north. It seems to live for the most part at the bottom, two or three miles out at sea, but is often taken in drift-nets after a storm. The Nurse Hound (*S. catulus*, Cuv.) is plentiful along the south, for the most part in deepish waters on a rocky ground. It is evidently a bottom-feeder, and is in places taken with hook and line as a bait for the Crab-pots. It was taken near Sennen in September, 1906, but has been probably overlooked on the north coast. The Black-mouthed Dog-fish (*Pristiurus melanostomus*, Bonap.) was taken at Polperro in 1834. Dunn f. reports one he saw in an emaciated condition at Newlyn in the late spring of 1906. The Smooth Hound (*Mustelus vulgaris*, Müller et Henle) has been obtained on the south coast all the year round, but is most plentiful during the months of July, August, and September. On the north coast it has been identified twice during the last eight years. The Porbeagle Shark (*Lamna cornubica*, Gmel.) is often common in deep waters to the south and south-west of the county from early summer into autumn, and is at times so troublesome to the Mount's Bay Mackerel fishermen by dashing backwards and forwards among the fish that they are obliged to draw in their nets and go elsewhere. The Shark itself is rarely caught except with baited lines, for when it gets rolled up in the net it quickly makes a hole the size of its head and slips out without causing very serious damage to the net. It is occasionally reported from the Bristol Channel. Vallentin mentions one caught in St. Ives Bay in a Herring-net that measured 8 ft. 3 in. The Thrasher (*Alopias vulpes*, Gmel.) is taken almost every year in the Mackerel- and

Pilchard-nets; and in some seasons, notably the late summer of 1899, and the month of October, 1907, several have been seen along the coast about the same time. On Aug. 20th, 1902, a small specimen measuring 4 ft. 2 in. in length was captured near St. Ives, and it has been twice reported from Tintagel. Some of the Cornish specimens are very large. In June, 1874, one 13 ft. long was killed at Scilly. The Basking Shark (*Selache maxima*, Gunn) is a rare visitor from the Mediterranean, notable for its great size, Couch's specimen measuring 31 ft. 8 in. in length. One was apparently seen by the crew of an east coast Mackerel-boat in May, 1900, some miles south of the Wolf, and one was brought into Penzance a few years ago. Three specimens of the Six-gilled Shark (*Notidanus griseus*, Gmel.) have been taken in the county, the last at Mevagissey in 1873. The Picked Dogfish or Spur Dog (*Acanthias vulgaris*, Risso) is the most serious scourge the Cornish fishing industry has to contend against. In some years great crowds appear irregularly in the waters of the south and west, disturb and destroy the shoals of Pilchard and sometimes of Herring and Mackerel, and dash suddenly and recklessly on the fish just as they are entering the net, and not only ravenously devour every single specimen but in their savage onslaught often destroy the net as well. So abundant are they in places that the boats are often compelled to abandon the infested grounds altogether for a time. Occasionally the "dogs" appear in incredible numbers, and are so widespread that the nets are destroyed to an alarming extent, and the continuance of the Mackerel, Pilchard, and Herring fishery under such conditions would be altogether impossible. In the early part of last autumn a steam-drifter shot a boulter, with two thousand hooks, eight miles south-west of the Lizard. The captain says that when the line was drawn there was a Dogfish on every hook, and in some cases three or four savagely clinging to a captured "dog," and in others only the head and gills were left on the hook (Pezzack). All along the Channel from the Eddystone to the Longships, and off Pendean and St. Ives, the shoals last autumn were numerous and dense. On the morning of November 15th the nets of two fishing-smacks in Whitsand Bay, W.N.W. of the Eddystone, suddenly became alive with Dogfish, tearing and rending the meshes in all directions. The efforts to

haul the nets on board having failed, the men tried to tow their tumultuous catch into port, but in a few minutes every fish had torn its way through and escaped, leaving only the tattered nets behind. News, too, had just come to hand that the Mevagissey fleet of sixty boats had returned to its moorings after one of the worst autumn Pilchard seasons on record. On account of the abundance of Dogfish the nets could not be left in the water, and even when a catch was made the Pilchards were devoured, and the nets rendered useless before they could be hauled on board. At every fishing port along the south a similar tale was being told, and the autumn Pilchard fishery last year threatens to be a disastrous failure. The loss inflicted by these predatory vermin of the sea during the past few years has excited considerable public interest in the county, and sundry schemes have been put forward for lessening the evil. One of these is to draw the "dogs" together in some convenient place by an extensive dumping of fish-offal in the sea, and then to blow them to pieces with dynamite. Attempts have also been made to popularise the fish as an article of food under the recently adopted name of "Flake." When skinned and cooked fresh the flesh is firm, wholesome, and palatable, but for various reasons it is most readily saleable when smoked, in which condition its quality and flavour are excellent. With a good and reliable market for the fish, special nets could be prepared for its capture, and its presence might then be turned to profit.

A stray specimen of *Centrina salviani*, Risso, was trawled in twenty-six fathoms near the Wolf, and was described by Cornish (Zool. 1887, p. 221). The Spinous Shark (*Echinorhinus spinosus*, Gmel.) has been frequently obtained along the south coast, twelve county specimens being mentioned by Day. One 5 ft. 4 in. long was brought in by a trawler at Newlyn on Dec. 10th, 1899, and one 7 ft. 5 in. in length was caught with hook and line in Falmouth Bay on July 4th, 1902. The Angel-fish or Monk-fish (*Rhina squatina*, L.) is fairly common in spring and summer along the south, and is occasionally taken on the north coast, especially at St. Ives. It is caught in trammels, on long lines, and at times in trawls, and is used by the crabbers for bait. The Torpedo (*Torpedo nobiliana*, Bonap.) has been frequently captured round the coast from Polperro to St. Ives, and

during the last eight years has been recorded nine times on the south coast, the last in 1906 at Newlyn (Pezzack). On May 26th, 1904, a specimen about $3\frac{1}{2}$ ft. long was found dead near the mouth of the Camel, and in 1905 two were reported and one seen by the writer at St. Ives. The Common Skate (*Raia batis*, L.) is fairly common along the south coast, and evidently local on the north. It may often be taken in some quantity with a boulder on a sandy bottom close to "scuddy" rocks, and is frequently brought in by trawlers. The Flapper Skate (*R. macrorhynchus*, Raf.) has been recorded from the south coast, but is not distinguished from the Common Skate by the fishermen, and has not been seen by the writer. The White Skate (*R. alba*, Lacep.) is locally fairly common in deep waters from Dundererry round to St. Ives in summer and early autumn, and has been obtained near Padstow. Small specimens were very common at Pendower Beach, Falmouth, last year (1906), and were readily captured with hand-lines. The Long-nosed Skate (*R. oxyrhynchus*, L.) is occasionally brought in by trawlers, more especially from the west and south-west. In some years at least it is common on a little patch of "scuddy" ground in forty-five fathoms of water about a mile west of the Wolf Lighthouse. The Shagreen Ray (*R. fullonica*, L.) is mentioned by Couch as rare in Cornwall. On June 21st, 1900, the writer found a specimen 2 ft. 7 in. long in the fish-market at Penzance that had been brought in from Mount's Bay. The Thornback (*R. clavata*, L.) is common from shallow water to twenty-five fathoms on a sandy bottom all round the coast, and locally also in deeper water throughout the summer. In winter it has been taken with a long line at a depth of fifty fathoms. Last year (1906) it was unusually plentiful in the deeper water inside the long sandy bar at Pendower Beach, Falmouth, where it was voraciously feeding on the Plaice, small Turbot, and other flat-fish that are generally to be found there in considerably quantity. The Homelyn or Spotted Ray (*R. maculata*, Mont.) is common on sand, especially in shallow water, along the south coast, but seems to be local on the north. This and the Thornback are the chief edible Rays in the county. The Blonde (*R. blanda*, Holt et Calderwood) is said to be larger and more spiny than the Homelyn, with which it has till recently been confounded. Holt says Couch's description

applies to both, but was based on a specimen of the Blonde. The Painted Ray (*R. microcellata*, Mont.) appears to fluctuate in numbers, but is usually fairly common and in places abundant throughout the summer along the south coast. For the last few years it has been plentiful near Mevagissey. In 1901, and again in 1906, it was common in Gerran's Bay from fifteen fathoms downwards. In 1901 and 1902 it was taken in quantity two or three miles out in Falmouth Bay, and of late it has been common locally in Mount's Bay. The only recognized Cornish specimen of the Starry Ray (*R. radiata*, Don.) known to the writer was brought into Newlyn on Nov. 14th, 1902, from some "scuddy" ground close to the Wolf in about forty-five fathoms of water. It measured $16\frac{1}{2}$ in. in length and $12\frac{1}{2}$ in. in breadth. The Cuckoo Ray or Sandy Ray (*R. circularis*, Couch) is frequently taken on sandy and "scuddy" ground in deep water along the south, and off St. Ives. It has been taken lately off Mevagissey, at Portscatho, off Pendower Beach, and has been reported from Cove-rack, off Praa Sands in Mount's Bay, and twice from St. Ives; but it does not seem to be at all prevalent in any of these localities. The Sting Ray (*Trygon pastinaca*, L.) is a frequent casual from shallow water downwards in sand, and especially in muddy sand, all round the coast from Dowerdy to Padstow. The largest Cornish specimen seen by the writer measured 2 ft. 8 in. in length and 1 ft. 8 in. broad, and was taken by hook and line in twenty-three fathoms in Falmouth Bay. On Aug. 2nd, 1901, five small ones were taken at the mouth of Helford River. Couch says the Eagle Ray or Whip Ray (*Myliobatis aquila*, L.) has once occurred in Cornwall. Several specimens have been taken off Plymouth (Day).

The Sea Lamprey (*Petromyzon marinus*, L.) is apparently scarce. On May 17th, 1902, two were seen and one gaffed in Fowey Harbour, and on April 10th one was taken at St. Mawes. The Lampern or River Lamprey (*P. fluviatilis*, L.) is frequently taken in the Lynher and its tributaries, but does not seem to be known in the west of the county. The Mud Lamprey (*P. branchialis*, Cuv.) is common in almost all the rivers of Cornwall. Because of its great toughness it is much in request as a bait for Whiting-Pollack. The Hag-fish (*Myxine glutinosa*, L.) is described by Cornish as rare, and apparently the only county

record is of a specimen found by Cocks in the stomach of a Cod at Falmouth. The Lancelet (*Branchiostomma lanceolata*, Pall.) is evidently very local in sand down to forty-five fathoms all along the south coast, but cannot be considered rare. In a favoured spot in twenty-five fathoms in Falmouth Bay eleven were obtained at a single cast of the dredge in 1904, and specimens have been taken on each of three subsequent visits to the same place. On the north coast single specimens have been found at St. Ives and at Padstow. Vallentin found young larvæ 4 to 6 mm. long fairly common in St. Ives Bay in August, 1905, but in spite of careful dredging was not successful in finding its permanent habitat.

NOTES AND QUERIES.

AVES.

Eggs of Red-backed Shrike (*Lanius collurio*).—Your correspondent's suggestion in regard to the variation in the eggs of *Lanius collurio* (Zool. 1907, p. 429), to my mind, is entirely wrong, contrary to my own experience, and to what I think is now generally accepted as a concrete opinion, *viz.* one bird, one type. If Mr. Mussel-White will take a trip to Bempton when the cliffmen are "egging," and get into conversation with some of them, they will convince him on this point in a very short time. They know from a very lengthy experience that in many cases (unless anything has happened to the bird) the same type of egg will be found on the same ledge year after year; so well do they know these particular spots that they will tell you what type of eggs they expect to bring up. Mr. J. M. Goodall has among his exceedingly fine series of eggs of Guillemot (*Uria troile*) the production of several birds extending over a number of years, and taken from the same ledges frequented by those particular birds. In each case they are all absolutely identical, and obviously laid by the same females, and would, I venture to say, convince the most sceptical oologist on this all-important and most interesting problem. Those who have formed a large series of the eggs of *U. troile* will appreciate the difficulty there is in finding two eggs identical in ground colour and marking. It is therefore a comparatively easy matter to trace those which are the produce of one female; though they may differ slightly in marking the general character is maintained. I have proved this conclusively in regard to many species (including *Lanius collurio*). Among them I may mention Black-headed Gull, Thrush, Nightingale, Nightjar, Cuckoo, Kentish Plover, Herring-Gull, Tree-Pipit, Blackbird, Kestrel, Redbreast, Lapwing, Richardson's Skua, Stone Curlew, &c. With regard to the Red-backed Shrike, it is well known that the eggs of this species vary considerably, but nevertheless are confined to four distinct types (not varieties). There are of course intermediate, modified, and extreme types, which may be, and should be, termed varieties, or, strictly speaking, varieties of types. In a large series of these eggs it is quite easy to detect these four

distinct types. The majority of writers are in error in regard to the number and description of these types, some of which are omitted altogether, or very inadequately described, Seebohm and Charles Dixon alone mentioning and accurately describing them, though Seebohm only figures two. They are well figured in 'Oologia Universalis Palæarctica,' George Thrause, part v., and in 'Eggs of the Birds of Europe,' H. E. Dresser, part viii. In the latter splendid work they are beautifully figured, but unfortunately Mr. Dresser has apparently left out the buff type. They are: (1) pure white to pale yellow; (2) palest pink to rich salmon; (3) pale green to greenish white; (4) pale brown to rich buff. I have placed them in the order to which they occur numerically. No. 4 type is the one to which I refer as having been inaccurately described or omitted altogether, chiefly, no doubt, owing to its rarity. For the present purpose I have thought it sufficient to refer only to the ground colour, which is, to my mind, the most important and only correct way of distinctly separating the types, not only of this species but of nearly, if not all, others. Now, it is quite obvious to me that the bird spoken of by Mr. Mussel-White as having produced the grey type in 1906 was not the same bird that produced the red type in 1907. Were his contention right, would he claim that in 1908 this bird would produce another type?—say, the green type—and finally, in 1909, it would produce the buff type, thus having produced the four types in four consecutive years. Now we come to the crucial point—is the bird to commence producing these four types over again, which it should be expected to do if Mr. Mussel-White's theory be correct? This is, I think, most improbable and quite contrary to the accepted rule of Nature. I am quite convinced in my own mind that the one type is perpetuated by one female (even though she may change her mate)—at least, all the evidence I have accumulated points in this direction—and the more experienced I become in the science of oology the more convinced I am, every season bringing fresh evidence in support. I will quote one case in point which has helped that conviction (in addition to the one already quoted). In the spring of 1906 I received from a correspondent in North Devon three eggs of the Tree-Pipit (*A. trivialis*) of a most uncommon variety, intermediate between the red mottled type and the red spotted or blotched type, which I had never seen before among the great number of clutches brought to my notice. This year I received, *from the same correspondent and locality*, a clutch which is identical in every respect and cannot have been produced by any other than the same bird. Speaking of eggs generally,

the age of the bird has nothing whatever to do with the coloration, except in regard to the intensity or modification of such, the predominating pigments always remaining the same. This of course only applies to normal conditions, and not to those birds whose condition has become abnormal and produce varieties or freak eggs. Food, I am inclined to think, has a certain influence on the colours of eggs, but not in regard to the actual and set types. Climatic conditions I do not find influence in the smallest degree the normal and set types, eggs from the Continent being identical in every respect with those found of the same species in this country, though in size and shape they may differ, but only to an almost imperceptible degree. Why Mr. Mussel-White should think that the Cuckoo (*C. canorus*) should perpetuate the same type of eggs and not the Red-backed Shrike I cannot say, though fully endorsing all he says in regard to *C. canorus*; of this I have in my series of Cuckoo's eggs sufficient evidence which to my mind is conclusive. As wonderful as it is (taking into consideration the risks entailed in migration) that certain birds return to the same neighbourhood annually, it must be remembered that after all they are simply being guided by their hereditary natural instinct. — PERCY F. BUNYARD (57, Kidderminster Road, Croydon).

Great Grey Shrike near York.—A fine specimen of the Great Grey Shrike (*Lanius excubitor*) was caught by two birdcatchers when "setting" limed twigs for Linnets at Strensall, near York, on Nov. 28th last. The Shrike, caught by the wing, struggled fiercely, and savagely bit at its captors, who, not knowing what the bird was, willingly disposed of it alive for a small sum. The purchaser kept it two days, endeavouring to get it to eat mice, which it readily killed but would not eat, and through lack of knowledge of Shrike's food on the part of its possessor the bird died of starvation, the preserved remains being added to the collection of Mr. Harry Dale, of York.—SYDNEY H. SMITH (20, Park Crescent, York).

Richard's Pipit (*Anthus richardi*) in Ireland.—On Nov. 22nd last a birdcatcher brought me a live bird taken in his net the previous night at Lucan, Co. Dublin, whilst netting Sky-Larks. As the bird had the appearance of a large Pipit, I had little difficulty in recognizing it from the description in Saunders's 'Manual' as a Richard's Pipit. Some idea of its rarity in this country may be estimated by the fact that the supposed occurrence in Ireland was in 1824, and that was considered so doubtful that it was removed from the Irish list by Messrs. Ussher and Warren in their work on 'The Birds of Ireland.'

This capture places the bird once more beyond doubt on the Irish list. It was seen in the flesh by Mr. R. M. Barrington.—W. J. WILLIAMS (2, Dame Street, Dublin).

Ospreys in Co. Sligo.—I regret to record the capture of two Ospreys (*Pandion haliaëtus*), within a few miles of one another, in Co. Sligo during the month of November last. The first was captured by a boy, the second was shot a fortnight after; they were both in immature plumage, and doubtless the offspring of the birds so rigidly protected in Scotland.—W. J. WILLIAMS (2, Dame Street, Dublin).

Night-Heron in Ireland.—An immature bird of this species (*Nycticorax griseus*) was shot on Lord Darnley's estate in Co. Meath on November 21st last. It was in fat condition and perfect plumage. Stomach empty when captured.—W. J. WILLIAMS (2, Dame Street, Dublin).

American Wood Duck in Oxfordshire.—Early in last December Mr. R. W. Calvert saw hanging up in Oxford Market a strange Duck, which he was informed had been shot on Otmoor—the great resort in Oxfordshire of wildfowl—on the 4th of the month. He most kindly purchased it and had it sent to me. It proved to be a specimen of the Wood (or Summer) Duck (*Æx sponsa*) in the plumage of the female. This beautiful Duck is one of the American species which is not admitted to a place on the British list, on the grounds that it breeds on ornamental waters in this country, and that young birds which are left full-winged sometimes wander away. But it has a wide range in North America—from Hudson's Bay to the Gulf of Mexico; and, according to Mr. D. G. Elliot, it is one of the earliest of the water-birds to start on its southern migration from the northern part of its habitat . . . "so anxious does it seem to be to get away from even the suspicion of winter" (cf. 'The Wildfowl of North America,' p. 87). The example in question was in good condition and in beautiful plumage, and weighed 17 oz. when it came into my hands.—O. V. APLIN (Bloxham, Oxon).

Wild Ducks near Lincoln City.—On the morning of Dec. 6th, 1907, I passed a sheet of water lying within a mile of the centre of Lincoln City, and, seeing that the surface was dotted over with wildfowl, I turned a strong pair of prism-glasses upon the birds, and saw that they consisted of Coots and no fewer than seven species of Ducks. The species and approximate numbers were as follows:—Mallard and Duck, fifty pairs; Teal, twenty-five pairs; Shoveler, three ducks; Wigeon, one duck; Tufted Ducks, ten, only one old drake; Pochard, three pairs;

Golden-eye, three, ducks or immature. Many Hooded Crows were flying about, and hundreds of Lapwings. The lake, known as the Ballast Pit, lies close to a railway embankment, and is perhaps half a mile in extreme length, being shaped like an obtuse-angled triangle. The day was bright and frosty, there being a little ice on the water, and the wind was light from the south-east. It was interesting to find so many species of wildfowl close to a populous city.—F. L. BLATHWAYT.

REPTILIA.

The Smooth Snake (*Coronella austriaca*) in Devonshire.—As there appears to be no record of the occurrence of the Smooth Snake in Devonshire, it may be worth while to note the recent capture of an example near Sidmouth. My friend and pupil, Mr. H. G. Oliver, was walking along a cliff-path at Weston Coombe, about three miles east of Sidmouth, on Sept. 14th last, when he disturbed a specimen basking in the sun by the side of the path. It at once tried to make off, but was partially disabled by a blow from a walking-stick. On being picked up it bit savagely at the hand of its captor; it was with some difficulty got into a sandwich-box and so carried home, being subsequently transferred to a bottle of alcohol. The specimen was brought to Nottingham for my inspection, and is an adult in good condition, measuring nineteen inches in length. — J. W. CARR (University College, Nottingham).

NOTICES OF NEW BOOKS.

Final Natural History Essays. By GRAHAM RENSHAW, M.B.,
F.Z.S. Sherratt & Hughes.

THIS is the third and final volume of Dr. Renshaw's natural history essays. It is solely confined to mammals, and refers to twenty-four different species of animals from various parts of the world. The volume is both popular and scientific; the first element is found in an eloquently written dream or reminiscence of the species in its original environment, the scene sometimes laid in prehistoric times; the second and very prominent feature is to be found in much bibliographical information as to the first description, status, and distribution of the creature. Nearly all the species are well illustrated from photographs taken by the author.

Many of the species which form the studies for these essays are, alas! approaching perilously near extinction, the lines which conclude the volume being almost too suggestive:—

" And I beheld and saw them one by one
Pass, and become as nothing in the night."

With some ghosts of their former selves, such as the South African Bontebok (*Damaliscus pygargus*), Dr. Renshaw has rendered distinct service by recording the number of specimens brought to Europe, and their location.

We are sorry to read that these are final essays, but finality is only an abstract term, and there is an element in the papers to which Dr. Renshaw will find it difficult to write *finis*. We shall therefore look forward to "New" or "Supplementary Essays" from the same writer, and the promise, we think, can be safely made that they will be as favourably received as their predecessors. These pages mark a very distinct advance on the general literature now so abundant on natural history topics.

We would rather have found an index than "Press Notices" at the end of the volume.

How to Sex Cage Birds (British and Foreign). By A. G. BUTLER, Ph.D., &c. "The Feathered World" Publishing Office.

THE opening words in the introduction to this very useful volume may be taken as its justification :—" Amongst technical ornithologists it has been a custom, much to be deplored, to describe all birds in which the sexes do not exhibit marked differences in colour of plumage, or well-defined external ornamentation, as follows: 'Female similar to male.'" In America more minute examination is now being made with unsexed preserved skins, and keys being sought to discriminate the sex of same. This question has for some years engaged the attention of Dr. Butler, and it is a study for which he was particularly well equipped. Not only is he a well-known aviculturist, and has had a large number of live birds both British and foreign under his constant observation, but for many years he was in charge of the Lepidoptera at the British Museum, where he was recognized as having acquired a remarkable keenness in the detection of minute differences among butterflies and moths. This faculty has now placed him in an excellent position for the discrimination of the slightest sexual characters in the plumage and superficial structure of birds. He has also made prolonged examination among the skins contained in the wonderful collection of the British Museum, and has compiled sexual descriptions, where available, from much of the ornithological literature. The result is this small and well-illustrated volume, which will long remain a text-book on the subject. In some cases the differential equation will not appear so clear to those who have not the trained eyes of the author for the lesser distinctions, which are not infrequently difficult to express in words. A shepherd is said to individually recognize his sheep—another acquired faculty which is difficult to explain in words, and requires personal tuition and an apt pupil. Dr. Butler, however, has given us a book which clearly sets forth a large number of clearly apprehended sexual differences, and as to a considerable number of others he gives the key for a more difficult identification.

This small volume is amply illustrated, and contains four coloured plates.

The Useful Birds of Southern Australia, with Notes on other Birds.

By ROBERT HALL, F.L.S., C.M.Z.S., &c. T. C. Lothian,
Melbourne & Sydney.

THIS book is for the horticulturist a vindication of a number of common Australian birds. Their depredations are shown to be in the main useful, their food that of the gardener's enemies, their habits innocuous. Of the Yellow-rumped Tit (*Acanthiza chrysorrhoa*) we read:—"Each Tit that owns a house in an orchard is worth more than its weight in gold, so valuable are the services of this insectivorous genus. On no account whatever, except for strictly scientific purposes, should this bird be killed or driven from a garden." On the other hand, introduced species may become noxious. "Australia has no bird that proves so disastrous to rural industries as the introduced Sparrow. A law for its stringent suppression should be a satisfactory one." The European Starling is recognized as "come to stay. Being gregarious, its every action for good or for ill is one of whole measure. . . . Up to the present time the bird as a help-mate to the grazier and farmer is a valuable one. To the orchardist the menace is a serious one." In the introduction we are told:—"It is a problem for the future to decide whether a war of suppression shall be waged against the Starling, and it behoves all who have the farming interests at heart to closely watch its ways. Remember the Rabbit and the Sparrow!"

Apart from the avine economical standpoint, this small and fully illustrated volume tells us much of the life-histories of the species which are included in its category, the details given being not those of a compiler but the observations of a well-recognized Australian ornithologist. Our space will not allow a long quotation, otherwise we should like to print the summary given of a paper by Mr. M'Alpine on the relations between the Lory and the fungus of the citrus tree. Mr. Hall has written a useful book on an important subject.

EDITORIAL GLEANINGS.

A PAPER was recently read at Hampstead by Mr. W. F. Kirby, F.L.S., &c., on "Ants from a Social and Theosophical Standpoint." Mr. Kirby commenced his paper by remarking that while much that is taught as Theosophy is true, much is highly probable and other statements cannot at present be verified, and must be treated as useful working hypotheses, to be verified or disproved later on. Among these was the statement that several distinct lines of evolution were running their course in this world parallel with our own. He thought it more probable that ants belonged to one of these than to our own line of evolution. There are four groups of insects which stand out as prominently from the rest of the insect world as does man from the larger animals. These are bees, wasps, termites or white ants, and ants, the last of which are the most interesting. He then spoke of the contrast between ants and ourselves; how they emerge from the eggs as helpless maggots, and are cared for by the working members of the community (which are sterile females) till they reach their perfect state, when they are born with all their working tools, including brushes and combs, and are able to take their share of the work of the community. Their senses are different from ours, for there is reason to believe that they see colours which are invisible to us. Some of their communities are so vast that a single colony might contain a much larger number of individuals than the whole human population of the globe. Most communities own large herds of cattle (plant-lice, caterpillars of blue butterflies, &c.), and pets, whilst others subsist by the chase or by growing corn or mushrooms. Generally speaking, ants are very patriotic; and there are no unemployed, for in an ant's nest it is each for all and all for each. But strangers from another nest are often ruthlessly slaughtered, while wars between one nest and another are not uncommon. Still more remarkable are the slave-making ants, some of whom have become so degenerate that they will actually die of starvation in the midst of plenty unless they have a slave to feed them. They are also annoyed by various enemies and parasites, among others by a small cricket, which is in the habit of slyly

nibbling at an ant till she turns round, when the cricket bolts. In conclusion, Mr. Kirby said that our proceedings would probably appear far more irrational to beings proportionately larger than ourselves than those of ants do to us.

Large Fish Caught in 1907.—Exceptionally large "game" fish have been killed, notably a splendid Salmon of $61\frac{1}{2}$ lb., caught in the Tay below Perth by Mr. T. Stewart; a 50 lb. specimen from the Awe, at Taynuilt, landed by Dr. Child; and a 47 lb. Salmon, secured in the Earn, another Scottish river, by the Hon. H. Stonor. Over thirty years have elapsed since the Tay yielded to rod and line such a large Salmon as that recorded above. In Norway there has also been caught a 62 lb. Salmon.

The Trout landed have included the record fish for London waters—the 18 lb. specimen secured by Mr. J. Brigg in the New River at Harringay—though the best Trout from the Thames only scaled 8 lb. 3 oz., a falling off in the weights of previous years. The Thames fish was secured by Mr. P. Green, President of the London Anglers' Association. Trout of 17 lb. 4 oz. (Lakes of Killarney), 14 lb. 12 oz. (caught in Ireland by Mr. Buckingham, Gresham Angling Society), 13 lb. 3 oz. (taken by Mr. H. Currell, Jun., of Hertford), $13\frac{1}{2}$ lb. (secured at Lough Corrib by Captain C. E. Bruce), and $12\frac{3}{4}$ lb. (taken in the Frome at Dorchester by the Rev. S. E. V. Filleul) have been secured. Of the Grayling creelers, one of 3 lb., taken by Mr. Zerfass (Gresham Angling Society) from a Hampshire stream, heads the list.

In Pike the Thames has yielded the finest river specimen of the year, taken by Mr. E. J. Bowles at Oxford; it scaled 29 lb. A monster Pike of 34 lb. is also recorded from a Wiltshire lake, landed by Mr. Angerson, of the Bristol Golden Carp A. A. The Tweed has yielded one of 31 lb., the Nene a 24-pounder, and the Sussex Rother a $22\frac{1}{2}$ lb. Pike.

A couple of 6 lb. Chub hail from Hampshire, landed by Messrs. E. J. Walker (Piscatorial Society) and T. W. Bowman (Gresham); and Mr. Locksmith has taken, near Weybridge in the canal, the largest Carp known for many years; it scaled $19\frac{1}{2}$ lb. A splendid Carp of 14 lb. 8 oz. also fell to the rod of Mr. C. E. Cooke, in Twickenham Deep.

Some fine Roach have been basketed, including specimens of 2 lb. 9 oz., 2 lb. $8\frac{1}{2}$ oz., and 2 lb. 5 oz., the two former caught in the Arun by Messrs. P. Allum and A. L. Woode, and the latter taken in

the Thames at Shepperton by Mr. R. Smith. Large Dace have also been captured, including one of 1 lb. 6 oz., taken in a Christchurch mill-pool, and another of 1 lb. 1 oz., secured in Walton's river—the Lea. In merit, size for size, these Dace equal a 60 lb. or 70 lb. Salmon. The largest was caught by Mr. Hullett.

One of the heaviest Bream brought to bank was taken in the Colne by Mr. Gerken, a member of the West Green A. S., Tottenham; it scaled 7 lb. 1¼ oz. For size and quality the Thames has again furnished the largest Barbel of the season, this being a specimen of 10 lb., taken by Dr. Macroy at Sunbury, and fine Perch of 4 lb. (Old Windsor) and 3 lb. (Reading) are also recorded from this river.—*Evening Standard and St. James's Gazette*, Jan. 1st, 1908.

Voracity of the Chub.—"A friend once brought us a big Aire Chub to set up, weighing 4 lb. 2 oz. When opened it was found to contain a half-grown Water-Vole, which had no doubt been pulled under when crossing the river. Nothing in the shape of food seems to come amiss to the swarms of this fish, which thrive somehow in the sewage-contaminated parts of the Aire within the limits named."—W. H. Whitaker, "The Fishes of Upper Airedale" (*Bradford Scientific Journal*, July, 1907).

